

LIVERMORE LAB REPORT

A weekly compendium of media reports on science and technology achievements at Lawrence Livermore National Laboratory, June 9-13. Though the Laboratory reviews items for overall accuracy, the reporting organizations are responsible for the content in the links below.

SCIENTIFIC
AMERICAN

AMERICA'S LOVE AFFAIR WITH ENERGY



Wind power saw the highest energy gains from 2011 through 2013, according to the most recent U.S. energy flow charts released by Lawrence Livermore National Laboratory.

Americans used more renewable, fossil and even nuclear energy in 2013, according to the most recent energy flow charts released by Lawrence Livermore National Laboratory.

The total consumption represents a 2.4 percent increase in energy use compared to 2012 and is still slightly less than 2010.

Each year, the Laboratory publishes a powerful graphic of U.S. energy use. In the most recent version, you can see how the approximately 97 quadrillion British-thermal units (quads) of energy used in the United States can be broken down by uses and sectors. The Laboratory also has released a companion chart illustrating the nation's energy-related carbon dioxide emissions. Americans' carbon dioxide emissions increased to 5,390 million metric tons, the first annual increase since 2010.

To read more, go to [Scientific American](#).



SCIENTIST GOES TO SEA TO SOLVE PUZZLE



LLNL physicist Maxim Umansky performed a physics analysis of an underwater survival story off the Nigerian coast.

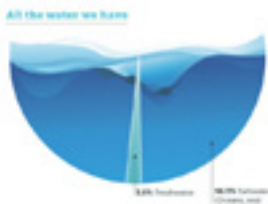
When Lawrence Livermore National Laboratory physicist Maxim Umansky flipped through the news a year ago, a startling underwater survival story caught his attention. In May 2013, a boat cook survived a 60-hour underwater ordeal 100 feet below the surface after his tugboat sank near the Nigerian coast.

Harrison Okene's survival underwater while the rest of the crew perished was astounding. As described in the media, the man "survived, breathing inside a four-foot high bubble of air as it slowly shrank from the waters rising from the ceiling of the tiny toilet and adjoining bedroom."

What intrigued Umansky most was the physics behind it. Even though Okene's story is not related to Umansky's physics research in LLNL's Fusion Energy Sciences Program, he wanted to understand the science of this underwater survival, inspired by his interests in physics and scuba diving.

To read more, go to [*Reader's Digest*](#).

The CHRISTIAN SCIENCE **MONITOR** NEW DESALINATION METHOD WORTH ITS SALT



The Earth contains about 3.5 percent freshwater while the remaining 96.5 percent is salt water (oceans, sea).

Turning seawater into drinking water is nothing new. But the current technology -- reverse osmosis, in which high-pressure pumps force water through semi-permeable membranes to exclude salt and impurities -- uses large amounts of energy and is damaging to the environment.

Researchers at Lawrence Livermore National Laboratory and Stanford University are working on a new desalination method using porous carbon aerogel electrodes. The system, which they call flow-through electrode capacitive desalination, or FTE-CD, removes salt electrically. Although in the early stages, its developers say the technique requires little equipment or energy, and the system could be scaled to fit any need: from portable personal devices to city water treatment.

"In places like California, where there is brackish groundwater in large volumes, FTE-CD can provide potable water at a potentially much lower cost than seawater desalination could achieve," said co-developer Michael Stadermann, a physical chemist at Lawrence Livermore. "For desalinating brackish water, we predict that this method could be up to five times more energy efficient than reverse osmosis."

To read more, go to [The Christian Science Monitor](#).



GOODBYE TO PAINFUL BLOOD DRAWS



A new device could improve patient care by dramatically reducing the number of missed needle sticks.

A new non-contact, near-infrared (NIR) camera that provides enhanced visualization of veins when drawing blood or placing IVs in a patient's arm or hand is the result of a collaboration between the City University of New York (CUNY), Lawrence Livermore National Laboratory and Near Infrared Imaging Inc. The camera, dubbed the Vein-Eye, displays real-time video for accurate and stress-free vein punctures.

Vein-Eye was developed by LLNL's Stavros Demos using intellectual property (IP) developed at Lawrence Livermore. Demos also used IP developed at the Institute of Ultrafast Spectroscopy and Lasers by Robert Alfano, a distinguished professor of science and engineering in the Departments of Physics and Electrical Engineering at CUNY.

The Vein-Eye uses two of the salient properties of light -- polarization and near-infrared wavelengths -- and the result is an increased ability to visualize veins. What's more, the technology is poised to improve patient care for a variety of patient populations by dramatically reducing the number of missed needle sticks.

Vein-Eye is FDA-registered and units will be available for shipment this month.

To read more, go to [BioOptics World](#).

PHYS^{ORG} RESEARCHERS HAVE NETWORKING ON THE BRAIN



A new neural device capable of recording and stimulating the human central nervous system is being developed at Lawrence Livermore National Laboratory.

A new device developed by Lawrence Livermore could help doctors better understand and treat post-traumatic stress disorder (PTSD), traumatic brain injury (TBI), chronic pain and other conditions.

LLNL recently received \$5.6 million from the Department of Defense's Defense Advanced Research Projects Agency (DARPA) to develop an implantable interface with the ability to record and stimulate neurons within the brain for treating neuropsychiatric disorders.

The neural device is designed to help researchers understand the underlying dynamics of neuropsychiatric disorders and re-train neural networks to unlearn these disorders and restore proper function. This will enable the device to be removed eventually from the patient instead of being dependent on it.

To read more, go to [Phys.org](#).

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance. To send input to the *Livermore Lab Report*, send [e-mail](#).